Review Paper

Environmental Impact: Contextualization and Current Reality

ABSTRACT

The environmental impacts of human acts have been a global concern of the contemporary era. The conflict between economic development and environment protection is a very important topic to be discussed before making any human activity that may cause negative effects to the environment. This work aimed to review the types of environmental impacts, their classes, and the Brazilian laws related to this content. Furthermore, this work shows the consequences of human actions around the world in nature that without the proper assessment can lead to disasters and consequences that may never be reversed. Although environmental impacts and sustainability are not new subjects, environmental disasters still occur with certain regularity worldwide, pointing to the people's negligence of possible outcomes from their conducts. It is of major importance that companies, farmers, and people in general realize the environmental impacts of their daily lives and acts, as well as the needed measurements to minimize the negative effects.

Keywords: Environment, Impact, Pollution, Assessment, Disaster

1. INTRODUCTION

In general, since the 1960s, there have been a high global concern with the environment and the equilibrium between environmental protection and economic development. Such relation is variable when considering developed countries against countries in development. Developed countries, with stable economy, tend to prioritize environmental protection, while countries in development, with difficulties to compete in the global market, tend to prioritize the economic development.

However, despite all this concern, there is some disinterest in certain environmental factors being an example the environmental accidents which frequently happen around the world, compromising soils, springs and, consequently, direct or indirectly, society as a whole.

In order to prevent this from continuing, it is necessary the development of materials that can be used as a tool to raise awareness over individuals and societies about the concepts related to this subject, as well as the actual reality in the world which we are inserted.

2. REVIEW

2.1 Environment

Brasil [1] defines environment as the set of conditions, laws, influences and physical, chemical and biological interactions, which allow, harbors and rules the life in all its forms.

However, such definition is generally incomplete, opening gaps for different interpretations by the jury, besides the diversity of terms related to the environment, from many other fields and subjects. In one side of knowledge, environment is considered a source from which society takes the necessary for its development and survival, being these resources usually called naturals. Over other perspective, it is considered as a source of life where ecological functions occur naturally, giving rise to the concept of environmental resource, that is, there is a supply of resources or the possibility of providing functions that support the life within nature/environment [2].

This affirmation is supported by [3], which do not define environment as a medium only to be defended or preserved integrally, but as a system with competence to provide resources and renew social forms and matters of development, being this also supported in a more actual context by [4].

Theys [5] conceptualizes the environment in two ways, the objective and the subjective. The objective treats the environment as a union of many natural objects of different scales and organizations among them, being that able to be considered biocentric since the species involved in this classification do not have superiority over others. On the contrary, the subjective conception treat environment as the relations between humans and the medium, that is, between subjects (societies, individuals) and objects (fauna, flora). Fiorillo [6] separate environment into different classes such as artificial environment, digital environment, cultural environment, work environment and natural environment.

2.2 Pollution

Environmental topics took years to be considered publicly in Brazil after this theme as included in the international agenda, leading to the creation of laws that addressed the issue of environmental protection, particularly with problem situations related to pollution. In an uncomplicated way, pollution is understood ass any form or condition that is harmful to living beings. Such conditions are usually from human activities which, in a certain way, “dirty” the environment [2].

While in Brazil, laws against pollution were addressed in 1975 in Rio de Janeiro and 1976 in São Paulo, other countries of the world, such as USA and United Kingdom, started worrying with pollution years before. In 1948, the USA already had a law to control water pollution and in 1955 a law referring to air pollution, similarly to United Kingdom that, in 1956, decreed a law of clean air [2].

It can be understood as pollutants elements or factors that are possible to measured and with standards established by regimentations, such as chemical compounds in the waters, vibrations, radiations, noises and harmful gases thrown in the air. However, such definition is absent in the National Environmental Policy Law, that equals pollution to environmental impact, being that not all pollutions have an impact as its cause but, all pollution causes an

environmental impact. Thus, due to confusion of interpretation caused, this term began to be replaced by a broader, environmental impact [1, 2].

2.3 Environmental impact

Environmental impact is commonly associated to damages to nature. The literature also brings some ways of classification such as all kinds of alterations caused to the environment in a simplified form or as a whole, caused by human interferences or the effect of an action induced by the man over the ecosystem [7, 8].

According to Munn [9] it is necessary to introduce the dynamic processes that occur in the environment, so it can be established the environmental changes that may be determined as impacts. Still, according with this author, when determining the impact of an undertaking it is necessary to compare two hypothetic situations, one considering how the situation without the undertaking would affect the environment and other considering the undertaking installed. The difference between these two situations will show the environmental impact caused by the undertaking and not the difference between the actual situation with the future one with the undertaking, which generally shows an environmental impact smaller than the one considering the future situation.

The NBR ISSO 14.001 [10], of 1997 defines environmental impact as any changes in the ambient, adverse or benefic, that results, as a whole or in part, of the activities, products or services of an organization. Being this concept largely used by companies and organizations for their environmental management.

Environmental impact can also be defined as any kind of alterations that the environment goes by, being it chemically, physically or biologically, resulting from human activities that release any kind of matter or energy that may, directly or indirectly, affect the populations health, economical and/or social activities, the values of the environmental resources and the biota [11].

According to Sanchez [2] this definition is still not correctly followed when carrying the environmental impact assay or following its restrict sense in the interpretation realized by the courts, being another definition of pollution.

2.3.1 Classifiction of environmental impact

In the context of environmental impact, it is possible to carry out a stratification and classify the other existing environmental impacts, being them positive, negative, direct, indirect, local, regional, strategic, immediate, medium or long term, temporary, permanent, cyclic and reversible. It is worth pointing out that an undertaking may cause more than one environmental impact during its execution [2].

2.3.1.1 Positive environmental impact

Positive environmental impact is considered to be the one that improves any environmental factor or parameter, being these incited by the government [2]. As an example, it is possible to mention the relocation of a street population to a block of popular houses, waste management, recovery of riparian forest, implementation of new undertakings [12].

2.3.1.2. Negative environmental impact

When a certain action is taken and this result in some kind of damage that harms the quality of a parameter or an environmental agent, there is the negative environmental impact [2]. These must be discouraged by the government and, if necessary, through penalties arising from the authorities. As example of negative environmental impact there is the clandestine destination of pollutants by companies or citizens, directly into the air or water without proper treatment.

2.3.1.3 Direct and indirect environmental impact

The direct environmental impact is that with a simple reaction where there is a cause and an effect, while the indirect is when a secondary reaction or a chain reaction caused by the first action [2]. The extinction of a forest decreases or extinguish the local biological diversity, causing a direct impact. The gas release by a company may cause acid rain, being it an indirect effect [13].

2.3.1.4 Local, regional and strategic environmental impact

When the impact does not affect other regions, but only the place within the undertaking, it is considered to be as a local impact, as an example can be mentioned a mining undertaking. When the impact extrapolates the action surroundings, as the implementation of a highway, there is a regional impact. Strategic is that of collective or national interest, such as the implementation of irrigation projects in the Brazilian northeast by means of the transposition of a river [13].

2.3.1.5 Immediate, medium or long-term and cyclic environmental impact

One action which effect happens immediately is called immediate environmental impact, as an example there is the mortality of fishes in a river caused by the liberation in it of toxic compounds. The bioaccumulation of contaminants in the food chain is an example of medium or long-term impact, taking time for these effects to appear, and, when determined effect occurs in time intervals there is the cyclic impact [13].

2.3.1.6 Temporary and permanente environmental impact

Temporary impact can be exemplified by the overflow of petroleum into a stone coast which is gradually absorbed, in a certain amount of time. Radiation is an example of permanent environmental impact, its effects can many times take many years to be minimized [13].

2.3.1.7 Reversible and irreversible environmental impact

The burning of tires causes an air pollution that, with the time comes back to its original conditions, thus being a reversible impact. An erosion process caused due to excessive rainfall is an irreversible environmental impact since the soil needs thousands of years to build its fertility [13].

2.4 Adopted measurements

When known the environmental impact of a particular undertaking, the Brazilian legislation determine compensatory or mitigatory measurements to be made, except in positive/benefic cases. Compensatory measurements are the ones where there is a negative impact without the possibility of it to be minimized, being necessary some measure to compensate the

damage caused. Mitigatory measure allows the minimization of a negative impact, as the use of ecologically correct products in constructions [2].

2.5 Environmental Impact Assay (EIA)

The emergence of the Environmental Impact Assay (EIA) as a mechanism for environmental management for the last 40 years coincides with the recognition of the nature, scale, and implications that environmental changes have brought for human actions [14].

The Environmental Policy Act was the first one that represented a formal incorporation of the study process about impacts in the legislative form [15]. The law stablished a national policy which would guide the federal agencies activities which may or may not affect the population, communities and the natural environment in a significant way, besides being an answer to the popular interest as well as for scientists for the increase in the contemporaneous environmental changes [16].

Internationally, the institutionalization of EIA had a minimum progress in the last decades, receiving particular emphasis through the growing political recognition of the problems associated with climate change, biodiversity loss, threats to hydric resources and water quality, damages to marine areas in addition to other forms of global environmental changes [14].

Various interpretations exist about EIA, as an activity that identify, predict, clarify and transmit information about any activity that will harm the welfare, as an instrument of environmental policy composed of a grouping of procedures that is capable to assure a systematic exam of the possible environmental impacts of an undertaking proposed and its alternatives, which results are demonstrated in a proper way for the lay population and for those responsible for making the decisions or yet, an ordinated process that evaluate in advance the repercussions of the human acts [9, 7, 17].

The Environmental Impact Assay must be elaborated for any undertaking that may or will cause future damages to the environment, this way its realization must be previous to the undertaking installation. Base on this approach, the EIA is carried mainly in mining undertakings, pipelines, hydroelectric, highways, industries, slurry treatment stations and sanitary landfills [11].

This instrument is very used in Brasil since 1986, based on its requirement and the Environmental Impact Report, all covered by the national environmental legislation [11, 18].

2.5.1 Environmental impacts classifications

In the EIA comprehensiveness area, a specific number of forms has developed since the 1970s, including the Social Impact Assay (SIA), Health Impact Assay (HIA), Strategic Environmental Assai (SEA). To certain extension, each one tends to have arisen through some level of dissatisfaction with the EIA in how it has been practiced [14].

2.6 Brazilian Legislation

Brazil has one of the most complete and advanced environmental legislations of the world. The idea of protecting its areas and natural ecosystems of the Brazilian environment date from 1934, when the Brazilian Forestry Code was created and, since then, many codes, resolutions, laws and decrees appeared with the intention of assure the national ecosystems

protection. However, the legislation is not adequately applied due to the inexistence of resources and technical capacity for enforcement [19].

The environmental crimes law, or Nature Law (law nº 9.605 of February 12th of 1998), deal with violations and punishments, in addition to defining and classifying environmental crimes into six types, Crimes against the Fauna: aggressions committed against wild animals, being them native or in migratory route; Crimes against the Flora: destroy or damage permanent preservation forests even if they are in formation process, or to use it against the protection rules; Pollution: the pollution that causes or may cause damages to human health, death of animals and expressive liquidation of the flora; Crimes against urban planning and cultural heritage: construction in preservation areas or its surroundings, without authorization or in discordance with the conceded authorization. Crimes against the environmental administration: false or misleading statement, omission or omission of information and technical-scientific data in environmental licensing or authorization processes; and further administrative infractions: actions or omission that violates legal rules of use, enjoyment, promotion protection and recovery of the environment. The individual or legal entity that infringes the law, if proven guilty, author or co-author, can be penalized with fines ranging from R $ 50.00 to R $ 50 million reals. Such punishment also can be reverted if the causer is responsible and proves the recovery of the environmental damage [20].

3. COMPANIES AND THEIR MEASUREMENTS FOR THE ENVIRONMENTA IMPACT REDUCTION

3.1 Svenska KullagerFabriken

Svenska KullagerFabriken, or SKF is a company of global importance in the supply of products and services for fences, bearings, lubrication systems and mechatronics. The company intended, in 2016, to implant tactics for the program that they call Beyond Zero strategy, which has as fundament the thought of positive environmental impacts creation going beyond the simple idea of operational reduction of environmental impacts. Besides the reduction in carbon production, energy spending and reduction of production related costs, the strategy aims to bring innovation to the production system in order to diminish or prevent environmental impacts. Among the strategies used by the company there is an aggressive management system of energy expenses in all 140 industries around the world; use of different kinds of transportations that will reduce carbon emissions, besides the adoption of a better logistic of transport and distribution for its products [21].

3.2 Coca-Cola Enterprises

In the same idea of environmental impacts reduction, the Coca-Cola Enterprises aims to have a low-cost carbon production aligned to a zero waste, focusing on innovation, packaging and recycling. The company already guarantee that 99,5% of tis wastes is already recyclable, however, its goal is to recycle even more packages than the ones used in its production of more than 12 billion bottles [21].

4. ENVIRONMENTAL DISASTERS

The environmental impact can be considered as an environmental disaster when the damages caused are irreparable or incalculable. In the sequence there are some of the main environmental disasters from the past decade.

4.1 Hungary, 2010

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In October 2010, in Ajka, happened one of the most serious environmental accidents in Hungary. In an aluminum factory, the containment dams have broken down and, approximately one million cubic meters of toxic solid wastes were scattered along the streets of Ajka. The “red sea” of wastes reached up to two meters high in some parts of the city. As a result, four deaths were confirmed, 123 were injured and more than 400 inhabitants of the region had to be removed, which showed a reaction to the toxic substance in question [22, 23].

4.2 United States, 2010

In April 2010, on the Deepwater Horizon oil rig, followed an explosion that generated the largest oil spill in the United States. This accident caused 11 deaths, 17 were injured and about 3,9 million barrels of petroleum polluted the water during the 87 days until the company could finally close the leakage. An enormous black mark was formed on the American coast due to the leakage. This disaster caused environmental consequences with the decimation of the marine fauna and political and economic consequences, mainly in the tourism and fishing activities of the region, since the beaches were interdicted for various months [22, 24].

4.3 Brazil, 2015

In november 2015, a dam that contained contaminated mud from the mining process of the company Samarco, in the interior of Minas Gerais, broke. This caused the liberation of about 62 million cubic meters of wastes, which advanced over the city Mariana and neighboring cities. This tragedy caused 18 deaths, besides the contamination of the Rio Doce basin, responsible for the supply of more than 230 municipalities in the state and in Espírito Santo state. The Brazilian Institute of Environment and Renewable Natural Resources (“*IBAMA – Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis”*), evaluated the ecological impact and considered that more than 80 species of the river were in risk, of which 12 were specific to this habitat, and these may have been extinct. Thus, it is believed that the river will not return to its natural state [24, 25].

5. CONCLUSION

From the literature consulted it is possible to conclude that the environment has a broad concept, which encompasses much more than the natural environment, or exclusively physical, as it is customary to imagine. The Brazilian legislation is very complete and points out the use of various techniques and methods for the evaluation of the environmental impact of a particular enterprise or activity, and that when done previously the installation is effective in eliminating or reducing the negative effects. Even so, there was a deficiency in the compliance and inspection of pertinent Brazilian environmental legislations. There is also a need to understand the policies and duties of the general public regarding the environment.

COMPETING INTERESTS

The authors declare no competing interests.

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